PBEEEP
State Government

Public Buildings Enhanced Energy Efficiency Program

SCREENING RESULTS FOR SAINT CLOUD TECHNICAL AND COMMUNITY COLLEGE

St.Cloud Technical College

Minnesota STATE COLLEGES & UNIVERSITIES

March 21, 2011

Campus Overview

Saint Cloud Technical and Community College	
Location	1540 Northway Drive, St. Cloud, MN 56303
Facility Manager	Jason Theisen Director of Facilities
Number of Buildings	16
Interior Square Footage	451,444 (from B3)
PBEEEP Provider	Center for Energy and Environment (Angela Vreeland)
Date Visited	2/17/2011
Annual Energy Cost	$416,716* (from 2009 utility data)
Utility Company	Electric: Xcel Energy Natural Gas: Xcel Energy
Site Energy Use Index (EUI)	70 kBtu/sqft* (from 2009 utility data)
Benchmark EUI (from B3)	125 kBtu/sqft*

*NOTE: These values do not include the energy used by the Allied Health Center.

Saint Cloud Technical and Community College (SCTCC) is comprised of sixteen buildings. Thirteen of the buildings are attached and make up the Main Building, which is 381,460 square feet and contains offices, classrooms, shops, a cafeteria, and a commercial kitchen. The three remaining buildings are the Child Care Development Center, the Customized Training and Education Center (CTEC), and the Allied Health Building. These are detached buildings that are 7,673 square feet, 7,925 square feet, and 54,386 square feet, respectively. There is a map of the campus at the end of this report.

Screening Overview

The goal of screening is to select buildings where an in-depth energy investigation can be performed to identify energy savings opportunities that will generate savings with a relatively short (1 to 5 years) and certain payback. The screening of Saint Cloud Technical and Community College (SCTCC) was performed by the Center for Energy and Environment (CEE) with the assistance of the facility staff. A walk-through was conducted on February 17, 2011 and interviews with the facility staff were carried out to fully explore the status of the energy consuming equipment and their potential for recommissioning. This report is the result of that information.

Recommendation

A detailed investigation of the energy usage and energy savings opportunities of the 16 buildings listed below totaling 451,444 interior square feet at SCTCC is not recommended at this time. The floor areas listed in the table have not been verified.

Building Name	State ID	Building	Area (sq ft)	Year Built
Main Building A & B Wing	E26208T0165	Main	64,17	1965
Phase II E & F	E26208T0371	Main	28,47	1971
A & D Wing Add	E26208T0678	Main	7,962	1978
I Wing	E26208T0783	Main	45,49	1983
G & E Wing Add	E26208T0986	Main	32,93	1986
Phase III G	E26208T0472	Main	62,36	1972
Courtyard Add & Boiler House	E26208T1202	Main	12,53	2002
Phase I C & D Bldg	E26208T0270	Main	31,07	1970
I Wing In-Fill Add	E26208T1095	Main	3,200	1995
A Wing Add to Graphic Arts	E26208T1199	Main	1,362	1999
Classroom Addition	E26208T1306	Main	46,48	2007
Phase IV H	E26208T0574	Main	44,73	1974
Block Building	E26208T1304	Main	672	2004
Child Care Development Center	E26208T1404	Child Care	7,673	2004
Customized Training and Education Center	E26208T1690	CTEC	7,925	1985
Allied Health Building	E26208T1585	Allied Health	54,38	1985

There are many factors that are part of the decision to recommend an energy investigation of a building; at SCTCC some of the characteristics that would indicate the campus is a good candidate for recommissioning are:

- Existing problems observed during screening phase
- Large square footage
- Level of control by the building automation system
- Equipment size and quantity
- Support from the staff and management to include building in an investigation

Although the building staff are clearly supportive of an energy investigation and would like to further reduce energy use at their campus, the energy use at the site is simply too low for a recommissioning study to be certain of delivering cost- effective savings. Recommissioning is focused on low-cost and no-cost measures that typically involve control changes and other minor adjustments to equipment operation. The Energy Use Index (EUI) for the Main Building, which makes up 84% of the total square footage at the site, is 68 kBtu/sqft. This is a very low EUI and indicates that the staff has already identified the majority of short payback items. Therefore, the likelihood of finding energy efficiency measures for the Main Building that will be cost effective is unlikely. In addition, the staff has already implemented many good ideas, and continue to pursue others to reduce their energy consumption.

The Child Care Development Center and Customized Training and Education Center (CTEC) are also not recommended for an investigation because they are small and have little energy use. The Allied Health Building is not recommended because it is currently undergoing a major renovation project.

Potential Energy Reduction Measures and Existing Problems

Although the campus is not a good candidate for an energy investigation, there were some potential measures and existing problems identified during the screening that may result in energy savings if resolved. The building staff is aware of these issues and they are listed below:

- Air handling units (AHUs) 420 and 421 cause extreme pressure issues throughout the Main Building, especially during the spring and fall. The amount of air being exhausted and the amount of air being brought in from the outdoors by these AHUs needs to be analyzed to ensure the pressure in the building stays slightly positive (0.05" wc, typically). The problem is worse when the air handlers are economizing, so the analysis should be done when the outside conditions are appropriate for economizing.
- During the summer, the Main Building is occupied at ¼ capacity, yet ¾ of the building is conditioned due to the classroom schedule. Class schedules could be optimized by grouping classes according to the spaces served by the AHUs. This may allow some of the AHUs to remain off. However, there are also offices located throughout the building, so this may be difficult to coordinate.
- The boilers often need to run during the summer for either domestic hot water or to condition spaces that require reheat. When the A or B Wing in the Main Building is being used, those areas especially need hot water for reheat because they are served by constant volume AHUs. Reducing or eliminating classes in those areas during the summer and installing a separate domestic HW heater may help reduce summer boiler operation.
- The I Wing in the Main Building has comfort issues where the rooms get too cold during the winter. To minimize this problem, the HW loop is kept at a higher temperature and higher flow than the building staff would like. The issue is most likely due to the fact that the air handlers are in a cramped attic space above the classrooms and the supply ductwork goes down under the floor and diffusers are in the floor around the exterior wall of the classrooms. There is a long run of ductwork and heat can easily be lost to the cold

surroundings underground. The underground ductwork is inaccessible. There is reheat, but it is up in the attic rather than at the diffusers. In addition, there is no perimeter radiation. This problem may not be able to be resolved by simple control changes. An analysis of the system should be done to determine if the problem is heat loss to the ground, lack of supply air due to the distance between the AHU and the diffusers, or if there are other issues.

Main Building Summary

Details obtained through the screening process regarding the Main Building are included in the following:

Mechanical Equipment

There are a total of 39 air handlers located throughout the Main Building. Most of the air handlers are constant volume, yet often serve Variable Air Volume (VAV) boxes as well as duct reheats. The air handlers use hot water and/or chilled water to condition the air. There are 162 VAV boxes, most with hot water reheat. Nearly all of the air handlers were balanced in 2004 and the balancing report is available; however, the building staff is not satisfied with the balancing that was done. The staff uses a flow hood and balances the equipment themselves as needed.

There are three low pressure steam boilers that produce 8-9 psi steam during the fall, spring, and winter. Depending on the summer class schedule, the boilers need to run during the summer as well. Summer operation varies significantly from year to year. Recently, the boilers had to run all summer long, since classes were scheduled in an area that required reheat primarily because some areas must be overcooled in order to reach acceptable levels of comfort in other areas. The steam from the boilers runs through two heat exchangers that transfer heat from the steam to hot water for use in the air handlers, reheats, and radiation. The steam also goes to a heat exchanger that produces domestic hot water. The steam from the boilers never leaves the boiler room- all of the mechanical equipment in the building uses hot water. The staff is interested in the viability of switching from a steam system to a hot water system for heating.

There are two chillers that produce chilled water for use in the air handlers. The newest chiller, which was installed in 2006, is a 500 ton water-cooled centrifugal chiller. Because it is efficient and has a large cooling capacity, it is used all summer long. The older chiller is a 250 ton absorption chiller and is rarely used because it has a lower capacity so it takes longer to reach the chilled water supply temperature setpoint. There are two cooling towers with Variable Frequency Drives (VFDs) that serve the chillers.

The following table lists the key mechanical equipment in the Main Building.

Mechanical Equipment Summary Table	
1	Building Automation System (Trane Tracer Summit)
13	Buildings
381,460	Interior Square Feet
39	Air Handlers
2	Make-up Air Units
162	VAV Boxes
~60	Exhaust Fans
8	Unit Heaters and Cabinet Unit Heaters
2	Chillers
3	Low Pressure Steam Boilers
6	Pumps (HW, CHW, etc)
3	Heat Exchangers
3	Computer Room Air Condition Units
3	Air Compressors

Controls and Trending

The mechanical equipment in the Main Building is controlled by a Trane Tracer Summit Building Automation System (BAS). The Trane system requires that one of the Building Control Unit (BCU) panels is updated before trending can be done. The trend data can be exported from the BAS in a usable format for spreadsheet analysis. All of the equipment in the building is digitally controlled and on the automation system; however, much of the equipment in the I, B, and A Wings have pneumatic actuation as well as many of the older air handlers throughout the Main Building. The pneumatic actuators are being replaced with digital actuators as failures occur.

Lighting

The majority of interior lighting on campus is 32 watt T8s. The staff has been testing the performance of 28 watt T8s and is likely to switch all of the current lighting in the building to 28 watt lamps. All of the interior lights are controlled by motion sensors.

Energy Use Index and B3 Benchmark

The site Energy Use Index (EUI) for the Main Building is 68 kBtu/sqft. This is 46% lower than the B3 Benchmark of 125 kBtu/sqft, however this benchmark value may be too high – the average EUI of all the MnSCU Community Colleges is 89; the EUI of the Main Building is 24% below this. The median site EUI for State of Minnesota buildings are 23% lower than their corresponding B3 Benchmarks. This indicates that SCTCC does not have as much potential to further reduce its energy use as other State buildings.

Metering

The Main Building has three electric and three natural gas meters. The Child Care Development Center, CTEC, and the Allied Health Building have their own natural gas and electric meters, so all the buildings are individually metered on campus.

Documentation

There is a significant amount of mechanical documentation, including building plans, equipment schedules, operations and maintenance manuals, and control sequences available on-site although not all of it is cataloged or organized. There is a balancing report from 2004 when nearly all the air handlers were balanced. There is also a boiler study from early 2011 that was done to look at options for optimizing the boiler plant.

Building Summary Tables

The following tables are based on information gathered from interviews with facility staff, building walk-throughs, automation system screen-captures, and equipment documentation. The purpose of these tables is to provide the size and quantity of equipment and the level of control present in each building. It is complete and accurate to the best of our knowledge.

Main Building
State ID# E26208T- 0165, 0371, 0678, 0783, 0986, 0472, 1202, 0270, 1095, 1199, 1306, 1690, 0574, 1304

Area (sqft)	389,385	Year Built	1965-2007	Occupancy (hrs/yr)	4,600*

HVAC Equipment

Air Handlers (39 Total)

Description	Type	Size	Notes
AHU 401	Constant Volume with SF and RF	22,700 cfm 25 hp SF 10 hp RF	HW and CHW, serves 13 reheats and 11 VAV boxes.
AHU 402	Constant Volume with SF and RF	34,000 cfm 40 hp SF 15 hp RF	HW and CHW, serves 24 duct reheats and 2 VAV boxes.
AHU 403	Constant Volume with SF and RF	18,250 cfm 20 hp SF 5 hp RF	HW and CHW
AHU 404	Constant Volume with SF and RF	12,000 cfm 10 hp SF 5 hp RF	HW only
AHU 405	Constant Volume with SF and RF	800 cfm 1 hp SF 1 hp RF	HW and CHW, serves Maintenance.
AHU 406	Constant Volume with SF and RF	10,000 cfm 10 hp SF 5 hp RF	HW only, serves Maintenance.
AHU 412	Variable Volume with VFD on SF	11,479 cfm 15 hp SF	HW and CHW, serves 20 VAV boxes.
AHU 413	Variable Volume with VFD on SF	12,921 cfm 15 hp SF	HW and CHW, serves 19 VAV boxes.

*NOTE: The building is at about ¼ capacity during the summer, yet because of the classroom schedule, ¾ of the building is conditioned.

Air Handlers Cont'd (39 Total)

Description	Type	Size	Notes
AHU 414	Constant Volume with SF	9,740 cfm 7.5 hp SF	HW only
AHU 415	Constant Volume with SF	3,316 cfm 5 hp SF	HW and CHW, serves 4 VAV boxes.
AHU 416	Variable Volume with VFD on SF	13,468 cfm 10 hp SF	HW and CHW, serves 13 VAV boxes.
AHU 417	Constant Volume with SF	7,571 cfm 5 hp SF	HW and CHW
AHU 418	Constant Volume with SF	3,473 cfm 3 hp SF	HW and CHW, serves 1 VAV box.
AHU 419	Variable Volume with VFD on SF	7,265 cfm 5 hp SF	CHW only, serves 11 VAV boxes.
AHU 420	Variable Volume with VFDs on SF and RF	32,500 cfm 60 hp SF	HW and CHW, serves 61 VAV boxes.
AHU 421	Variable Volume with VFD on SF	53,500 cfm 100 hp SF	HW and CHW, serves 62 VAV boxes.
AHU 422	Variable Volume with VFD on SF	5,063 cfm 5 hp SF	CHW only, serves 5 VAV boxes.
AHU 423	Variable Volume with VFD on SF	9,176 cfm 10 hp SF	CHW only, serves 8 VAV boxes.
AHU 424	Variable Volume with VFD on SF	3,304 cfm 5 hp SF	HW and CHW, serves 5 VAV boxes.
AHU 425	Variable Volume with VFD on SF	3,591 cfm 5 hp SF	HW and CHW, serves 3 VAV boxes.
AHU 426	Variable Volume with VFD on SF	2,744 cfm 5 hp SF	HW and CHW, serves 6 VAV boxes.
AHU 427	Constant Volume with SF	2,840 cfm 2 hp SF	HW and CHW
AHU 428	Constant Volume with SF	2,959 cfm 2 hp SF	CHW only
AHU 429	Constant Volume with SF	5,236 cfm 5 hp SF	CHW only
AHU 430	Constant Volume with SF	5,559 cfm 3 hp SF	HW and CHW
AHU 431	Constant Volume with SF	5,100 cfm 1 hp SF	HW only
AHU 432	Constant Volume with SF	5,106 cfm 3 hp SF	HW only
AHU 433	Constant Volume with SF	10,000 cfm 5 hp SF	HW only
AHU 434	Constant Volume with SF	16,403 cfm 7.5 hp SF	HW only
AHU 435	Constant Volume with SF	Unknown cfm 1 hp SF	HW and CHW
AHU 436	Constant Volume with SF	5,100 cfm 3 hp SF	HW only
AHU 437	Constant Volume with SF	34,805 cfm 30 hp SF	HW only

HVAC Equipment Cont'd

Air Handlers Cont'd (39 Total)

Description	Type	Size	Notes
AHU 440	Constant Volume with SF	2,500 cfm 1 hp SF	HW and CHW
AHU 441	Variable Volume with VFD on SF	800 cfm 1.5 hp SF	HW only
AHU 442	Constant Volume with SF	5,000 cfm 5 hp SF	HW and CHW
AHU 443	Constant Volume with SF	13,000 cfm 5 hp SF	HW and CHW
AHU RM178 Science Lab	Constant Volume with SF	8,100 cfm 7.5 hp SF	HW and CHW
AHU 417A	2-speed fan unit with SF	12,000 cfm 7.5 hp SF	
Boiler Room AHU	Constant volume with 2 SFs	7,000 cfm Unknown hp	HW only

Make-up Air Units (2 Total)

Description	Type	Size	Notes
Truck Shop MUA	2-speed Make-up Air Unit	12,000 cfm 5 hp SF	Natural gas, direct fire
Auto Body MUA	2-speed Make-up Air Unit	12,000 cfm 5 hp SF	Natural gas, direct fire

VAV Boxes (162 Total)

Description	Type	Size	Notes
162 VAV Boxes	Variable Air Volume Boxes		Almost all have HW reheat

Heating System

Description	Type	Size	Notes
Boiler 2 Boiler 3	Kewanee Low Pressure Steam Boilers	7,746 kBtu/hr output each	Supplies 8-9 psi steam to Main Building. Along with Boiler 4, 1 or 2 boilers operated at a time, generally operated Fall thru Spring and used as needed during summer, sometimes for a significant portion of the summer.
Boiler 4	Kewanee Low Pressure Steam Boiler	7,750 kBtu/hr output	Replaced two smaller boilers in 1999.
East HX West HX Dom HW HX	Steam to HW Converters		East and West HXs produce HW for AHUs, reheats, and radiation. Domestic HW HX produces domestic HW.
HWP 1 HWP 2	Variable Volume HW Pumps with VFDs	40 hp each	
FTR	Finned-Tube Radiation		HW, located throughout building.

HVAC Equipment Cont'd

Cooling System

Description	Type	Size	Notes
Chiller 1	Water-Cooled Absorption Chiller	250 Tons	Rarely used, takes a long time to get the CHW to setpoint.
Chiller 2	Water-Cooled Centrifugal Chiller	500 Tons	Operated all summer, supplies 55F CHWST. Installed in 2006.
CHWP 1 CHWP 2	Variable Volume CHW Pumps with VFDs	800 gpm each 50 hp each	Serve secondary CHW loop.
CT 1 CT 2	Cooling Towers	1,500 gpm each 30 hp each	VFDs on cooling tower fans.
CDWP 1 CDWP 2	Variable Volume CDW Pumps with VFDs	30 hp each	Serve condenser water loop.

Computer Room Air Conditioning Units (3 Total)

Description	Type	Size	Notes
7 CUHs	Liebert Units	37.3 Btu/hr 1,800 cfm each	Serve phone and server rooms.

Cabinet Unit Heaters (8 Total)

Description	Type	Size	Notes
8 CUHs	Cabinet Unit Heaters		HW, located at entrances.

Exhaust Fans (~60 Total)

Description	Type	Size	Notes
~60 EFs		1/3 hp and up	14 are on the automation system.

Air Compressors (3 Total)

Description	Type	Size	Notes
2 ACs	Air Compressors	40 hp	Serves shops
1 AC	Air Compressor	~15-20 hp	Back-up for nights and weekends

Points on BAS

Air Handlers

Description	Points
AHU 401	RAT, RF status, MAT, MAT setpoint, Econ damper position, Cooling valve, Heating valve, SF status, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, Space pressure, Space pressure setpoint, Space pressure damper, OAT, OARH, OA Enth
AHU 402 AHU 415	RAT, RF status, MAT, MAT setpoint, Econ damper position, Cooling valve, Heating valve, SF status, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, OAT, OARH, OA Enth
AHU 403 AHU 405 AHU 417	RAT, RF status, MAT, MAT setpoint, Econ damper position, Cooling valve, Heating valve, SF status, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, Space temp, Space temp setpoint, Night temp setpoint, OAT, OARH, OA Enth
AHU 404 AHU 406 AHU 414	RAT, RF status, MAT, MAT setpoint, Econ damper position, Heating valve, SF status, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, Space temp, Space temp setpoint, Night temp setpoint, OAT, OARH, OA Enth

Points on BAS Cont'd

Air Handlers Cont'd

Description	Points
AHU 412 AHU 413 AHU 424 AHU 425 AHU 426	RAT, Econ damper position, MAT, MAT setpoint, Cooling valve, Heating valve, SF status, SF VFD speed, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, DA DSP, DA DSP setpoint, EF status, OAT, OARH, OA Enth
AHU 416	RAT, RAT setpoint, RA CO2, RA CO2 setpoint, Econ damper position, MAT, MAT setpoint, CO2 reset, Heating valve, Cooling valve, SF status, SF VFD speed, DAT, Max DAT setpoint, Min DAT setpoint, Calc DAT setpoint, DA DSP, DA DSP setpoint, OAT, OA RH, OA Enth
AHU 418	RAT, RF status, MAT, MAT setpoint, Econ damper position, Cooling valve, Heating valve, SF status, DAT, Max DAT setpoint, Min DAT setpoint, Calc DAT setpoint, Space temp, Space temp setpoint, Radiation setpoint, Radiation valve open/close, OAT, OARH, OA Enth
AHU 419 AHU 422 AHU 423	RAT, Econ damper position, MAT, MAT setpoint, Cooling valve, SF status, SF VFD speed, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, DA DSP, DA DSP setpoint, OAT, OARH, OA Enth
AHU 420	RA CO2, RF status, RF VFD speed, Econ damper position, MAT, MAT setpoint, Cooling valve, Heating valve, SF status, SF VFD speed, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, Max DA DSP, Min DA DSP, DA DSP setpoint, Space pressure setpoint, Space pressure, OAT, OARH, OA Enth, Ave Room temp
AHU 421	RA CO2, Econ damper position, MAT, MAT setpoint, Cooling valve, Heating valve, SF status, SF VFD speed, DAT, DAT high setpoint, DAT low setpoint, Calc DAT setpoint, Max DA DSP, Min DA DSP, DA DSP setpoint, Space pressure setpoint, Space pressure, OAT, OARH, OA Enth, Ave Room temp, Relief fan status, Relief fan VFD speed
AHU 427 AHU 430 AHU 435 AHU 440 AHU 442 AHU 443	RAT, Econ damper position, MAT, MAT setpoint, Cooling valve, Heating valve, SF status, DAT, DAT max setpoint, DAT min setpoint, Calc DAT setpoint, Space temp, Space temp setpoint, Unocc space temp setpoint, OAT, OARH, OA Enth
AHU 428 AHU 429	RAT, Econ damper position, MAT, MAT setpoint, Cooling valve, SF status, DAT, DAT max setpoint, DAT min setpoint, Calc DAT setpoint, Space temp, Space temp setpoint, OAT, OARH, OA Enth
AHU 431 AHU 432 AHU 433 AHU 434 AHU 436 AHU 437	RAT, Econ damper position, MAT, MAT setpoint, Heating valve, SF status, DAT, DAT high setpoint, DAT low setpoint, Space temp, Space temp setpoint, Unocc space temp setpoint, OAT, OARH, OA Enth
AHU 441	RAT, Econ damper position, MAT, MAT setpoint, Heating valve, SF status, SF VFD speed, DAT, DAT max setpoint, DAT min setpoint, Calc DAT setpoint, Circulation pump status, Space temp, Space temp setpoint, Night setback setpoint, Exhaust status, Radiation valve, OAT, OARH, OA Enth
AHU RM178 Science Lab	RAT, Econ damper position, MAT, MAT setpoint, Preheat valve, Cooling valve, Reheat valve, SF status, DAT, DAT setpoint, Space temp, Space temp setpoint, EF status, EA pressure, EA pressure setpoint, OAT, OARH, OA Enth

Points on BAS Cont'd

Air Handlers Cont'd

Description	Points
AHU 417A	Space temp, Space temp setpoint, Radiation valve, SF status, DAT, PRV status, OAT, OARH, OA Enth
Boiler AHU	RAT, Econ damper position, MAT, Preheat valve, Face/Bypass damper position, SF status, Reheat valve, DAT, DAT high setpoint, DAT low setpoint, Space temp, Space temp setpoint, OAT, OARH, OA Enth

Make-up Air Units

Description	Points
Truck Shop MUA	Summer/winter mode, Summer/winter changeover setpoint, Winter high speed changeover setpoint, MUA heat on/off, MUA high heat on/off, EF status, MUA low speed on/off, MUA high speed on/off, DAT, Space temp, OAT, OARH, OA Enth
Auto Body MUA	MUA heat on/off, Summer/winter mode, Summer/winter changeover setpoint, MUA fan high on/off, MUA fan low on/off, DAT, Space temp, EF status (3), OAT, OARH, OA Enth

Reheats

Description	Points
Each Unit	Space temp, Space temp setpoint, Valve position

Heating System

Description	Points
System	System enable on/off, East HX HWST, East HX HWRT, West HX HWST, West HX HWRT, Building HWST, Building HWRT, Boiler status (3), HWST reset, HWST setpoint, Converter valve position, Pump status (2), Pump VFD speed (2), Cond tank temp, Cond tank temp setpoint, Cond valve, HW DP I Wing, HW DP H Wing, Ave HW DP, HW DP setpoint

Cooling System

Description	Points
System	Chiller status (2), CHW DP (2), CHWST, CHWRT, CHW DP A Wing, CHW DP E Wing, Chiller 2 head pressure, Chiller 2 head pressure setpoint, Chiller 2 min flow setpoint, Chiller 2 max flow setpoint, Chiller 1 flow setpoint, Cond temp setpoint, System DP setpoint, CHWP status (2), CHWP VFD speed (2), Tower entering temp, Tower leaving temp, CDWP status (2), CDWP VFD speed (2), Cooling tower status (2), Cooling tower VFD speed (2), OAT, OARH, OA Enth

Computer Room Air Conditioning Units

Description	Points
Each Unit	Status, Space temp, Space temp setpoint

Cabinet Unit Heaters

Description	Points
Each Unit	Fan status, Space temp, Space temp setpoint, Reheat status

Exhaust Fans

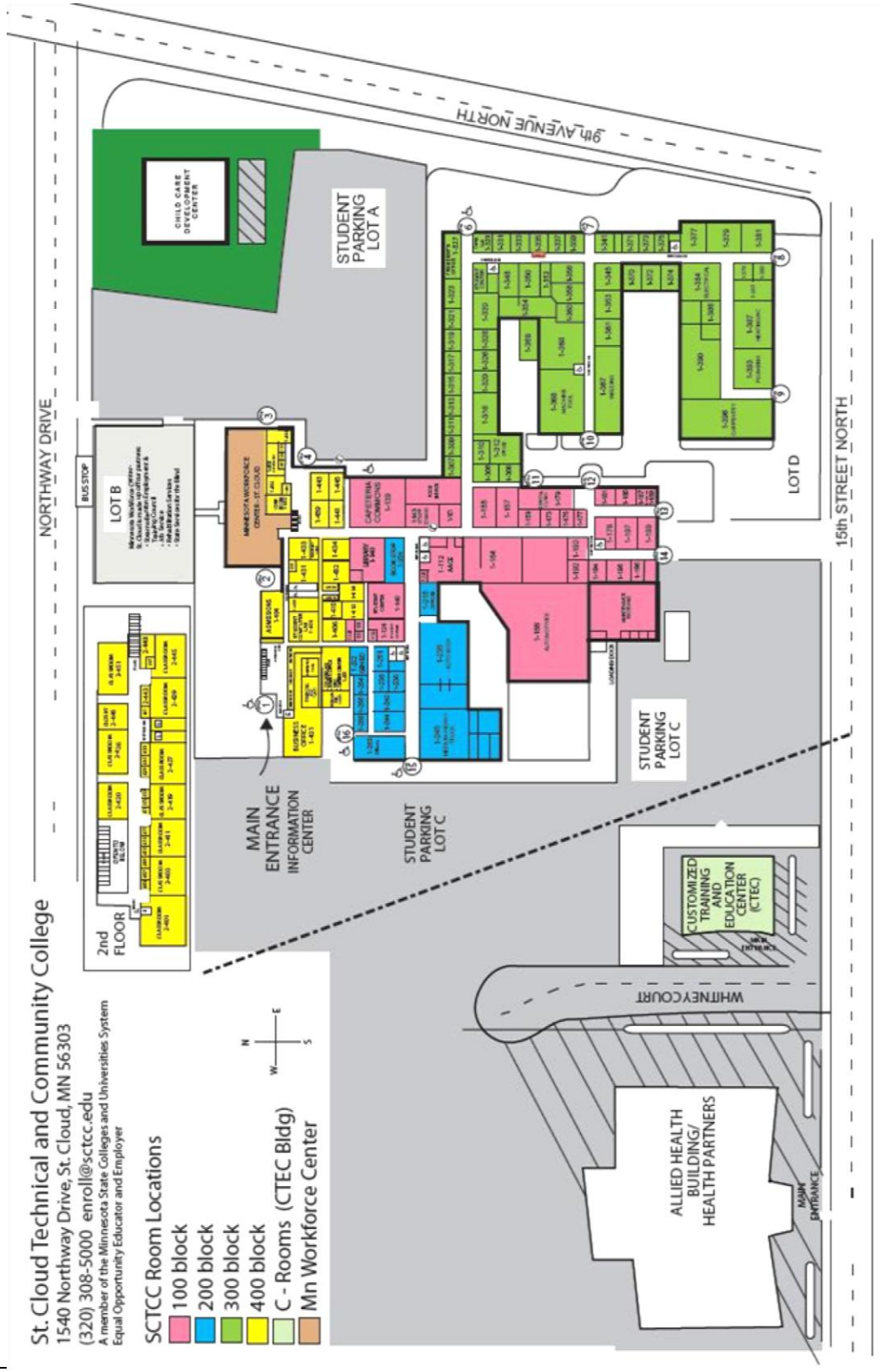
Description	Points
Each Unit	EF status, Space temp, Space temp setpoint

***NOTE: Not all exhaust fans are on the BAS**

Air Compressors

Description	Points
Each Unit	Compressor enable (3), Compressor amp draw (3), Space temp

Campus Map


9th AVENUE NORTH
NORTHWAY DRIVE
15th STREET NORTH
CHILD CARE DEVELOPMENT CENTER
STUDENT PARKING LOT A
LOT B
BUS STOP
LOT D
MAIN ENTRANCE INFORMATION CENTER
STUDENT PARKING LOT C
STUDENT PARKING LOT C
2nd FLOOR
CUSTOMIZED TRAINING AND EDUCATION CENTER (CTEC)
WHITNEY COURT
ALLIED HEALTH BUILDING/ HEALTH PARTNERS
MAIN ENTRANCE
St. Cloud Technical and Community College
1540 Northway Drive, St. Cloud, MN 56303
(320) 308-5000 enroll@sctcc.edu
A member of the Minnesota State Colleges and Universities System
Equal Opportunity Educator and Employer
SCTCC Room Locations
100 block
200 block
300 block
400 block
C - Rooms (CTEC Bldg)
Mn Workforce Center

PBEEEP Abbreviation Descriptions			
AHU	Air Handling Unit	hp	Horsepower
BAS	Building Automation System	HRU	Heat Recovery Unit
CD	Cold Deck	HW	Hot Water
CDW	Condenser Water	HWDP	Hot Water Differential Pressure
CDWRT	Condenser Water Return Temperature	HWP	Hot Water Pump
CDWST	Condenser Water Supply Temperature	HWRT	Hot Water Return Temperature
cfm	Cubic Feet per Minute	HWST	Hot Water Supply Temperature
CHW	Chilled Water	HX	Heat Exchanger
CHWRT	Chilled Water Return Temperature	kW	Kilowatt
CHWDP	Chilled Water Differential Pressure	kWh	Kilowatt-hour
CHWP	Chilled Water Pump	MA	Mixed Air
CHWST	Chilled Water Supply Temperature	MA Enth	Mixed Air Enthalpy
CRAC	Computer Room Air Conditioner	MARH	Mixed Air Relative Humidity
CV	Constant Volume	MAT	Mixed Air Temperature
DA	Discharge Air	MAU	Make-up Air Unit
DA Enth	Discharge Air Enthalpy	OA	Outside Air
DARH	Discharge Air Relative Humidity	OA Enth	Outside Air Enthalpy
DAT	Discharge Air Temperature	OARH	Outside Air Relative Humidity
DDC	Direct Digital Control	OAT	Outside Air Temperature
DP	Differential Pressure	Occ	Occupied
DSP	Duct Static Pressure	PTAC	Packaged Terminal Air Conditioner
DX	Direct Expansion	RA	Return Air
EA	Exhaust Air	RA Enth	Return Air Enthalpy
EAT	Exhaust Air Temperature	RARH	Return Air Relative Humidity
Econ	Economizer	RAT	Return Air Temperature
EF	Exhaust Fan	RF	Return Fan
Enth	Enthalpy	RH	Relative Humidity
ERU	Energy Recovery Unit	RTU	Rooftop Unit
FCU	Fan Coil Unit	SF	Supply Fan
FPVAV	Fan Powered VAV	Unocc	Unoccupied
FTR	Fin Tube Radiation	VAV	Variable Air Volume
GPM	Gallons per Minute	VFD	Variable Frequency Drive
HD	Hot Deck	VIGV	Variable Inlet Guide Vanes

Conversions
1 kWh = 3.412 kBtu
1 Therm = 100 kBtu
1 kBtu/hr = 1 MBH